UNITED
NATIONS

E

Economic and Social Council

Distr.
GENERAL

E/CN.17/1996/20/Add.6
29 February 1996

ORIGINAL: ENGLISH

COMMISSION ON SUSTAINABLE DEVELOPMENT
Fourth session
18 April-3 May 1996

PROGRESS IN THE IMPLEMENTATION OF THE PROGRAMME OF ACTION FOR THE SUSTAINABLE DEVELOPMENT OF SMALL ISLAND DEVELOPING STATES

Report of the Secretary-General

Addendum

Development of communications in small island developing States

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INTRODUCTION

A. Background

1. The major outcome of the Global Conference on the Sustainable Development of Small Island Developing States was the Barbados Declaration and the Programme of Action. The Conference, unlike the United Nations Conference on Environment and Development, held at Rio de Janeiro, specifically mentioned telecommunications and its importance to this group of countries. The Inter-Agency Committee on Sustainable Development subsequently named the International Telecommunication Union (ITU) as the task manager for telecommunications, with the task of reporting to the Commission on Sustainable Development at its fourth session. The present report, which contains an overview of telecommunications development in small island developing States, examines its possible uses for sustainable development in these islands and makes some recommendations for the future.

B. Definitions

2. Telecommunication is defined by ITU 1/ as any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic system. Telecommunication transmission media include metallic cables, optical fibre cables, terrestrial radio and satellite radio links. Telecommunication services include telephony, telegraphy, telex, data communications, facsimile, broadcasting (radio and television), and electronic mail.

3. With the advent of digital technology, there is an increasing merger between telecommunication and computing, ushering in a maze of information technologies with attendant new services, among which electronic mail - Internet - is the fastest growing. The merger has caused the coining of a new word in European usage - telematics - which is the application of computer services to telecommunications.

4. Non-public applications include meteorology, civil aviation, maritime communications, remote sensing, radar and telemetry, military etc., over which ITU has a nominal regulatory role through frequency assignment and certain transmission characteristics.

5. Mobile services, which were largely maritime in the past, have now encroached upon land with cellular services and global land-mobile services via fixed satellites or, soon, via low Earth orbit (LEO) satellites. There is virtually no limit to the proliferation of new services, making telecommunication and its associated information technologies the most profoundly pervasive service in the modern information society for the twenty-first century.

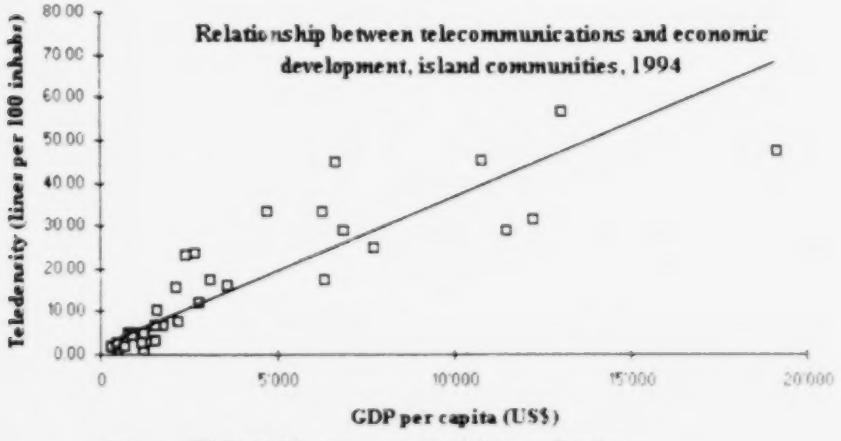
I. WHY TELECOMMUNICATIONS

A. Telecommunications for overall development

6. As is already apparent, the pervasiveness of telecommunications means that it finds application in virtually every human activity. It is now acknowledged as the engine for growth and development in the socio-economic development of any modern economy. Consequently, ITU has upgraded its status from a priority requirement to a basic human need, and from a catalyst to an active element in the development equation. The right to communicate is a basic human right, as ITU and the United Nations Educational, Scientific and Cultural Organization (UNESCO) now plainly put it. For small island developing States, the need for telecommunication services of all sorts is more compelling, given their general remoteness, smallness and isolation.

7. That telecommunications and its information technologies are essential for modern socio-economic development is now an accepted fact. The relationship between telecommunications and socio-economic development has been a topic of numerous studies in the past. Though the studies differ as to the exact degree to which telecommunication contributes to economic development, virtually all agree that there is a close relationship. The strength of this relationship is evident in a graphic representation of gross domestic product (GDP) per capita (as a surrogate for economic development) plotted against teledensity (column 5 vs. column 7 of table 2), which is shown in the figure for small island developing States. This relationship is drawn in the figure as a straight line, but it is more accurately a non-linear relationship as it appears easier to increase teledensity for low-income countries than for the high-income ones. If this is true, it would suggest that telecommunication investment brings higher social and economic benefits in the lower-income countries than in the higher-income ones, at least in terms of benefits per extra dollar spent.

Figure 1



Source: ITU World Telecommunication Indicators Database

Some developmental applications are briefly discussed below.

1. Trade and commerce

8. Modern trade and commerce requires rapid and at times interactive means of communications. As news of world events and occurrences that affect trade now travels faster or instantaneously, e.g., behaviour of economic indicator variations in major currencies, take-overs and mergers, and disasters, it is vital to be "plugged in" in order to take appropriate measures and countermeasures as may be required. As the World Telecommunication Development Report, 1995, published by ITU, states:

> "Try to imagine an amount of money equal to US$ 2.3 trillion, larger than the economies of most countries, moving through an electronic network. That is the magnitude of electronic financial transactions which travel over just one network every day. It is mind-boggling, but only one example of the increasing flow of electronic information in the form of telephone conversations, fax, electronic mail and television broadcasts. This gigantic electronic wave illustrates the extent to which the world is becoming more dependent on electronic communications, is altering businesses, lifestyles and societies: children in Singapore use radiopaging devices to stay in contact with parents, aborigines in Australia sell paintings using videoconferencing, Brazilian banks offer services over the Internet, French residents consult electronic telephone directories to choose a plumber. From the dynamic to the mundane, electronic information services cross cultures, languages and age differences."

2. Rural development

9. Apart from tourism , it should be stressed that the overall socio-economic development of most small island developing States is strongly related to primary production, and that agriculture is the backbone of their economies, providing the source of livelihood for the population as well as being a major export earner. In view of the narrow natural resource base, its proneness to disruption by natural disasters, the small range of primary product exports and the limited local capital for productive investment, small island developing States need to join forces for their development. In this regard, communication and exchange of information becomes vital to their development. Avenues are there for island economies if tourism and agriculture are linked. Besides providing outlets for local agriculture and generating job opportunities in crafts and service sectors, fulfilling certain conditions (e.g., strict hygiene rules, guaranteed agricultural commodity, supplies in quality and quantity) requires a reliable communication system.

10. Telecentres or telecottages in rural areas provided on a communal basis not only offer the basic services such as telephony and fax but also reception centres for broadcasting services (radio and television) as well as telematic services and mass media. UNESCO and ITU have established many such pilot activities for overall rural socio-economic and cultural development, education, health, agriculture and tourism.

3. Tourism

11. Tourism and associated service industries are major contributors to the GDP of most small island developing States. Hotel reservations, tour operators and international travel services all require a sound telecommunication network at both local and international levels. No hotel can acquire a four- or five-star status without being endowed with ultra-modern telecommunication services, including a global news channel and a business centre. Service industries represent more than 50 per cent of GDP in small island developing States, of which telecommunications contribute, on average, 3.3 per cent (Sao Tome and Principe, 10.9 per cent; Barbados, 8.5 per cent; Kiribati, 6.5 per cent; Saint Kitts and Nevis, 9.6 per cent).

4. Transport and communication

12. Transport and communication services are increasingly reliant on good telecommunication systems for their efficient operations and management. Road and water public and private transport systems must be equipped with mobile telecommunication services to maintain a competitive edge, as well as to enhance their safety and security in regions of often hostile climatic conditions. In civil aviation, special air control communication is a mandatory requirement, without which the safety of aircraft and lives of airfarers would be jeopardized.

5. Administration and good governance

13. Efficiency in the administration and management of both public and private sector institutions, enterprises and concerns is enhanced by the present-day telecommunication services and information technologies, without which these activities would be severely bottlenecked and would probably grind to a halt. In national administration and capacity building, the government authorities in urban areas would find information technologies essential for communication with remote areas and islands. Telecommunications, electronic media and a vibrant press nurture democracy and good governance. The large diversity of sources and applications now makes it hard for dictators to control and manipulate the communications media as had been done the past. Good governance enhances sustainable development, which seeks to optimize the benefits of existing resources and to create new ones for present and future generations.

B. Telecommunications for environmental protection

14. The surveillance and monitoring of limited natural resources (water, forests, minerals, biological diversity etc.) is facilitated by special applications of telecommunications facilities in remote sensing, radar and telemetry. The ITU Plenipotentiary Conference, held at Kyoto, Japan, in 1994, adopted resolution No. 35, which commits the Union to accelerating the use of telecommunication technologies for the protection of the environment in pursuance of the ideals set out in Agenda 21. For small island developing States with relatively tiny land areas, the protection of their environment is

all the more crucial to assure sustainable development for present and future generations.

15. Measures to protect the environment, to use natural resources more efficiently and to promote sustainable economic development have been among the key issues of the 1990s. The 1992 Earth Summit in Rio de Janeiro served to focus the attention of the world on the future of our planet. The Global Conference on the Sustainable Development of Small Island Developing States specifically called for the use of telecommunications to help meet the ideals of Rio in this area. The telecommunication sector is playing its part in this process in a number of ways, including the following:

(a) By transporting information, in written, spoken, visual and electronic forms, telecommunications provides a viable substitute for the transport of goods or people. It is invariably more energy efficient and less polluting to move information. Videoconferencing can provide an alternative to long-distance travel; telecommuting, an alternative to commuting to work; and fax offers an alternative to postal services. Of course, the level of direct substitution will never be close to 100 per cent. Nevertheless, as tariffs for telecommunication services fall and congestion in transport networks rises, the equation is moving in favour of the former;

(b) Telecommunications can help directly in environmental programmes. For instance, telemetry (remote sensing and measurement) systems help in monitoring pollution levels, in assessing the size of the gap in the ozone layer, or in measuring traffic flows. Similarly, telecommunication systems are increasingly being used in programmes designed not only to monitor changes but actually to intervene, for instance in flow control systems for irrigation, in urban heat-recycling schemes or traffic management systems;

(c) Telecommunication manufacturers and operators are implementing their own environment-friendly programmes. For instance, these and other examples show how the telecommunication sector can play its part in achieving sustainable development for the benefit of mankind. Nevertheless, telecommunications development is not necessarily benign. Cellular radio transmitters and satellite dishes can blight urban environments. Unbalanced deployment of telecommunication networks can serve to reinforce the competitive advantage of urban areas over rural areas, thus speeding up processes of unplanned urbanization and accentuating differences between the information rich and the information poor.

C. Early warning and disaster mitigation

16. Most of the small island developing States are geographically located within the tropical zone where they lie exposed to seasonal climatic conditions of a catastrophic nature such as cyclones, hurricanes, typhoons and tropical storms. Satellites can now track these weather formations on a continuous basis and early warning can be given in good time on television, radio and other special networks to populations in the path of such a menace. There are also

early-warning systems on drought, deforestation, desertification, flooding and insect (locust) infestation, which are vital in agriculture and the environment.

17. The ITU Plenipotentiary Conference, held at Kyoto in 1994, adopted resolution No. 36, which calls for further studies designed to bring about intensified application of new telecommunication technologies for early warning, preparedness, disaster management and reconstruction in accordance with the ideals formulated under the auspices of the International Decade for Natural Disaster Reduction (see A/50/521) and the Tampere Declaration on Disaster Communications.

18. Telecommunication is also applied in agriculture to avoid disasters of serious food deficits which may lead to widespread famine. The Food and Agriculture Organization of the United Nations (FAO) has been operating, since 1975, a Global Information and Early Warning System on Food and Agriculture (GIEWS), in which about 10 small island developing States participate. The principal objectives of the System are to monitor continuously food supply/demand conditions, identify where food shortages are imminent and assess possible emergency food requirements with a view to disseminating in a timely manner information necessary for policy makers and operational relief agencies. Information is vital to warn where shortages may occur and how big they may be in order to prevent a crop failure causing widespread famine. Although measures are in place to improve the quality and flow of data from developing countries to the System, greater commitment from countries in providing the required information (on a voluntary basis) would contribute to producing more accurate analyses of the supply/demand situation.

D. Security

19. Many small island developing States are remote and isolated, which makes them susceptible to external aggression or even internal destabilization. The Comoros has been subjected to more than a dozen coups or coup attempts. Seychelles and Sao Tome and Principe have gone through this experience, as have some other small island developing States. The existence of good international telecommunication services tends to deter such action, as Governments can quickly call for assistance from friendly nations. Psychologically, good external telecommunication services help reduce the sense of isolation, as the islands feel they are part of a global village when plugged into a global information infrastructure. For archipelagic States, aerial surveillance of their huge exclusive economic zones (EEZs) against foreign illegal fishing is considerably enhanced by good intra-island telecommunication services.

II. PRESENT STATUS OF TELECOMMUNICATIONS IN SMALL ISLAND DEVELOPING STATES

A. Overview

20. In general, most small island developing States are relatively well served by telecommunication networks and services. However, there are large disparities between regions and among countries. The measure of

telecommunication accessibility or penetration - teledensity - is expressed in the number of main lines (ML) per 100 inhabitants. A similar ratio of radio or television receivers expresses the density of radio receivers or TV sets. Table 1 shows the average densities of these services in small island developing States against regional and world averages. With the exception of the Americas and the Asia-Pacific regions, whose figures are distorted by very high values in North America and Japan, all other groups of small island developing States are ahead of their respective regions. Table 2 shows the basic indicators in small island developing States, including teledensity. Teledensity is today considered one of the more accurate indicators of the socio-economic development of a country, perhaps more so than GDP per capita.

Table 1. Main line and television densities in small island developing States, 1994

	ML density			TV density		
GROUP	SIDS	Region	World	SIDS	Region	World
Africa	7.71	1.67	11.60	4.00	4.00	21.70
Americas	7.51	27.90	"	22.4	42.3	"
Asia-Pacific	16.31	21.72	"	20.70	28.60	"
Arab States	24.77	4.36	"	41.90	11.40	"
Europe	44.95	21.95	"	38.90	38.90	"

21. The reasonably good state of telecommunications in small island developing States is mainly attributable to the fact that it is relatively much easier and cheaper to implement a telecommunication network over a small area than over huge expanses of land where long terrestrial trunk routes and/or domestic satellite links add considerably to unit cost. In addition, larger populations tend to keep teledensities lower. But in no way should the commendable effort that the small island developing States have made to develop their networks be played down.

22. Small island developing States forming an archipelago or composed of atolls such as Maldives and the Marshall Islands have special problems in providing full access to all the populated and widely dispersed islands. Solutions usually involve submarine cable and terrestrial radio and satellite systems to interconnect the islands. Under these circumstances, it is evident that the cost of providing services in these islands is higher than that for a single small island.

Table 2. Basic indicators

Small island developing States	Population: Total (millions) 1994	Population: Density (per km²) 1994	GDP: Total (billions of US$) 1993	GDP: Per capita (US$) 1993	Main telephone lines: Total (thousands) 1994	Main telephone lines: Per 100 inhabitants 1994
Cape Verde	0.38	94	0.3	815	18.6	4.87
Comoros	0.49	260	0.2	470	4.3	0.88
Mauritius	1.10	592	3.1	2 799	129.4	11.72
Sao Tome and Principe	0.13	130	0.0	318	2.5	1.97
Seychelles	0.07	181	0.4	6 366	12.5	17.08
Africa	2.17	238	4.2	1 866	167.2	7.71
Antigua and Barbuda	0.07	147	0.5	6 867	19.2 a/	28.86 a/
Aruba	0.07	360	0.8 b/	12 274 b/	21.0 a/	31.34 a/
Bahamas	0.27	20	3.1	11 523	76.2 a/	28.64 a/
Barbados	0.26	607	1.6	6 280	87.0	33.35
Cuba	10.95	96	16.2 c/	1 537 c/	350.0	3.20
Dominica	0.07	95	0.2	2 715	16.7	23.52
Grenada	0.09	267	0.2	2 436	21.0	22.83
Jamaica	2.43	213	3.8	1 590	250.5	10.31
Netherlands Antilles	0.20	247	...	...	50.0 a/	25.54 a/
Saint Kitts and Nevis	0.04	157	0.2	4 712	13.6	33.16
Saint Lucia	0.15	216	0.5	3 145	25.0	17.24
Saint Vincent and the Grenadines	0.11	285	0.2	2 140	17.2	15.47
Trinidad and Tobago	1.29	252	4.6	3 575	203.8	15.78
United States Virgin Islands	0.10	303	1.3 c/	13 048 c/	59.0	56.52
Americas	16.10	108	33.3	2 152	1 210.2	7.52
Cook Islands	0.02	81	...	...	4.8	25.59
Fiji	0.77	42	1.7	2 219	59.5	7.71
Kiribati	0.08	113	0.0 b/	490 b/	1.9	2.50
Maldives	0.25	826	0.2	958	11.9	4.82

Small island developing States	Population		GDP		Main telephone lines	
	Total (millions) 1994	Density (per km²) 1994	Total (billions of US$) 1993	Per capita (US$) 1993	Total (thousands) 1994	Per 100 inhabitants 1994
Marshall Islands	0.05	29	...	...	3.0	5.69
Micronesia, Federated States of	0.11	77	0.2	1 773	7.2	6.74
Nauru	0.01	514	...	...	1.7	15.74
Niue	0.00	8	...	...	0.5	25.00
Papua New Guinea	4.21	9	5.1	1 227	40.0	0.95
Singapore	2.82	4 575	55.1	19 214	1 331.7	47.26
Solomon Islands	0.37	12	0.2	708	6.0	1.64
Tokelau	0.00	16	...	...	-	-
Tonga	0.10	140	0.1	1 543	6.5	6.60
Tuvalu	0.00	398	0.0 d/	1 212 d/	0.5	5.04
Vanuatu	0.17	11	0.2 b/	1 171 b/	4.4	2.68
Samoa	0.17	59	0.1 b/	916 b/	7.8	4.62
Asia-Pacific	9.12	17	63.0	7 035	1 487.4	16.32
Bahrain	0.55	830	4.0 e/	7 724 e/	135.9	24.77
Arab States	0.55	830	4.0	7 724	135.9	24.77
Cyprus	0.73	79	6.7 b/	10 821 b/	330.4	45.02
Malta	0.36	1 151	2.4	6 671	162.9	44.80
Europe	1.10	115	9.1	9 278	493.3	44.95
Total	29.03	41	113.6	4 036	3 493.9	12.04

Source: ITU, United Nations, International Monetary Fund, World Bank, Organisation for Economic Cooperation and Development.

Note: Three dots (...) indicate that data are not available.

a/ 1993.

b/ 1992.

c/ 1989.

d/ 1990.

e/ 1991.

23. Table 3 shows investment per main line and confirms the significantly higher cost for dispersed groups of islands (Maldives, Papua New Guinea, the Marshall Islands etc.). Comparison with non-island States of similar wealth shows that the cost of providing services in the small island developing States is only slightly higher, principally owing to economies of scale enjoyed by the larger countries.

24. A review of the regional perspective is given in the paragraphs below.

Table 3. Telecommunications investment

Small island developing States	Telecommunications investment: Total (millions of US$) 1994	Per inhabitant (US$) 1994	Per main line (US$) 1994	As a percentage of revenue 1994	As a percentage of GFCF a/ 1993
Cape Verde	4.6	12.1	248	21.9	5.7 b/
Comoros	0.9 c/	1.6	217	19.7	2.3
Mauritius	33.5	30.3	259	49.4	6.7
Sao Tome and Principe	0.4	3.3	165	15.8	0.9
Seychelles	7.9	108.4	634	28.2	6.2
Africa	47.3	21.4	283	38.2	6.3
Antigua and Barbuda	...	...	...	...	...
Aruba	23.7 b/	354.4	1 164	49.6	...
Bahamas	31.2 b/	119.1	392	25.9	...
Barbados	22.6 c/	87.1	274	16.3	6.8 d/
Cuba	38.1 b/	3.5	113	12.1	...
Dominica	5.2 b/	72.1	378	...	...
Grenada	...	...	...	...	...
Jamaica	114.8 c/	47.5	550	51.6	16.6 d/
Netherlands Antilles	...	...	...	...	...
Saint Kitts and Nevis	2.5	60.5	182	11.8	2.0 b/
Saint Lucia	18.5	127.6	740	...	...
Saint Vincent and the Grenadines	...	...	...	...	...
Trinidad and Tobago	36.0	27.8	177	24.1	2.9
United States Virgin Islands	...	...	...	...	...
Americas	292.6	19.0	297	26.5	9.1
Cook Islands					
Fiji	15.6 b/	20.8	314	35.3	7.5 b/

Small island developing States	Telecommunications investment: Total (millions of US$) 1994	Per inhabitant (US$) 1994	Per main line (US$) 1994	As a percentage of revenue 1994	As a percentage of GFCF a/ 1993
Kiribati	0.0	1.2	49	3.1	0.4 b/
Maldives	8.0	32.6	677	54.1	...
Marshall Islands	10.3 c/	197.9	4 474	249.2	...
Micronesia, Federated States of	7.7	71.7	1 064	100.3	14.2
Nauru	...	...	...	...	...
Niue	...	...	...	...	...
Papua New Guinea	98.5 b/	24.3	2 701	75.2	9.7 b/
Singapore	342.5	121.5	257	14.9	1.6
Solomon Islands	1.6 c/	4.7	310	17.4	2.7 d/
Tokelau	...	...	...	...	...
Tonga	1.5 b/	16.4	275	59.7	...
Tuvalu	1.5 c/	160.0	9 975	728.5	...
Vanuatu	...	...	...	...	...
Samoa	...	...	...	...	...
Asia-Pacific	487.3	57.0	336	19.3	2.0
Bahrain	48.6	88.7	358	21.2	...
Arab States	48.6	88.7	358	21.2	...
Cyprus	75.4	102.7	228	47.7	3.1 b/
Malta	8.0	22.1	49	10.1	1.0
Europe	83.4	76.0	169	35.2	2.6
Total	959.2	34.5	297	22.7	2.7

Source: ITU.

Note: Three dots (...) indicate that data are not available.

a Gross fixed capital formation.

b 1992.

c 1993.

d 1991.

1. Africa

25. Africa's small island developing States (with the exception of the Comoros) have much higher teledensity than the average for the continent, which stands at 1.67. Mauritius (11.72) and Seychelles (17.08) have higher accessibility than the best-connected mainland State, South Africa, which has a teledensity of 9.48. Both Mauritius and Seychelles, which are already poised to become information societies in the twenty-first century, are endowed with novel services, including mobile cellular phones and radio paging, Internet and direct satellite broadcasting. Mauritius also benefits from the French TV programmes destined for the island Réunion. In Seychelles, intra-island communications within the archipelago is assured through terrestrial (submarine cable and radio) links.

26. There are no subregional groupings that involve all of the African small island developing States. All the five islands will, however, be linked directly by the proposed Africa-One optical fibre submarine cable around Africa, which will give all African coastal States access to the global information infrastructure and the information superhighway. The Pan-African Telecommunications Union (PATU) is mandated to harmonize the development of telecommunications in Africa. The Regional African Satellite Communications System (RASCOM) will facilitate the extension of reliable telecommunication services to remote and sparsely populated parts of Africa, including the African small island developing States.

2. The Americas

27. The Americas small island developing States are concentrated in the Caribbean subregion, which has linguistic, cultural and historic cohesion. Telecommunication operators are fully or partly owned by Cable and Wireless (C and W) of the United Kingdom of Great Britain and Northern Ireland or France Telecom. C and W has helped develop the eastern Caribbean fibre system, which will inter-link these countries and pave the way for cable television and other advanced new services in the region. A number of Caribbean small island developing States are exploiting their location and English language by developing information-processing centres for North American firms. More than 25 information-processing firms operating in Jamaica are linked by advanced communication facilities to clients in Canada and the United States of America. In Barbados, the Government has identified informatics as one of the areas with the greatest potential for generating foreign exchange and jobs. The Barbados Investment and Development Corporation has created Project Infotech 2000 to promote and market the services of local information companies such as electronic publishing, software development, computer-aided design and geographic information systems.

28. The average teledensity of the Americas small island developing States of 7.51 compares well with that of the Economic Commission for Latin America and the Caribbean (ECLAC) region, although the inclusion of the United States and Canada raises the Americas' average teledensity to 27.92. The Virgin Islands have the highest teledensity among the Caribbean small island developing States.

29. The Americas region has addressed the issue of information infrastructures at the Summit of the Americas in December 1994, where 34 heads of State met to discuss a variety of issues, including telecommunication and information infrastructures. They recognized that a country's information infrastructure is an essential element in political, economic, social and cultural development and agreed to promote private sector investment, competition and flexible regulatory regimes, and to ensure universal service. The Organization of American States Inter-American Telecommunications Centre (CITEL) was identified as the body that should prepare a work programme to evaluate regulatory, technical and legal issues to assist the countries of the region to achieve an information infrastructure.

3. Arab States

30. Bahrain, the only small island developing State in this region, has a well-developed telenetwork with a teledensity of 24.77, which is well above the region's average of 4.36. The Government is promoting the island as an information technology centre in the Gulf. Information technology is being spread through the government, industry, banking, education, insurance and commerce sectors spearheaded by the Bahrain Computing Forum. Batelco, the national public communication operator, is working with the country's information technology industry to develop interactive networked multimedia applications.

31. The present network is highly modern; it offers facilities that equal, and in some cases even surpass, the facilities offered in areas traditionally perceived as being ahead of the Middle East, such as Europe. All national and international switches on the island are digital. The national switches became 100 per cent digital in 1991 and the international switches became digital in 1993. All the national trunks connecting all the exchanges on the island are digital, constituting a fibre optic cable that forms a ring around the island connecting the exchanges. There is one satellite Earth station with three dishes: for the Atlantic Ocean Region (AOR), the Indian Ocean Region (IOR) and Arabsat. There is an analogue submarine coaxial cable linking Bahrain to Qatar and the United Arab Emirates, and a fibre optic submarine cable linking Bahrain to Saudi Arabia. A high-capacity fibre optic submarine cable for Gulf States (FOG) is planned to link Kuwait, Bahrain, Qatar and the United Arab Emirates in the near future. Bahrain has international distance dialing service to more than 200 countries.

32. The country also boasts other services such as data communications and international database access services, maritime communications, paging services, voice mail, mobile cellular phones, trunked mobile radio service, Internet and the Integrated Digital Services Network (ISDN). Bahrain Radio participates in search and rescue operations in the Gulf area.

4. Asia-Pacific

33. There are 15 small island developing States in this region, most of which are located in the Pacific subregion. They are characterized by very small

populations; only Singapore and Papua New Guinea have populations exceeding 1 million, while eight have less than 200,000, among which Nauru and Tuvalu have just 10,000 each. Six of these small island developing States are least developed countries. Their average teledensity is 16.31, boosted mainly by Singapore (47.25), Cook Islands (25.59) and Niue (25.00). Singapore has by far the most advanced telecommunication network among the Asia-Pacific small island developing States, more developed in fact than some of the networks of the Organisation for Economic Cooperation and Development (OECD). Some 15 per cent of its subscribers have mobile cellular phones compared to an average of 10 per cent for the high-income countries.

34. Regional organizations such as the Asia-Pacific Telecommunity (APT) and the Asia-Pacific Economic Cooperation (APEC) forum have been promoting the information infrastructure concept. The APT group has identified areas such as interconnection, open access, enhancement of value-added services, and regulatory frameworks as important for information infrastructure development. The APEC forum adopted the Bogor Declaration, which noted the critical role of infrastructure in the Asia-Pacific region and the need to create, as soon as possible, an information and communications network to connect the region to achieve sustainable growth and equitable development. The first APEC Ministerial Meeting on the Telecommunications and Information Industry adopted the Seoul Declaration for the Asia-Pacific Information Infrastructure (APII), setting out five objectives and 10 core principles to facilitate the development of an APII. The principles extend the elements of the group of seven industrialized countries to include the protection of intellectual property rights and the construction of national infrastructures based on their own reality.

5. Europe

35. The two European small island developing States, Cyprus and Malta, have relatively well developed telecommunication networks by western European standards. In Cyprus, there is a sharp contrast between the Greek and Turkish parts of the island, reflecting the development gap between the two communities.

B. Investment in telecommunications

36. Investing in telecommunication network development is a continuous process to meet the growing needs of expansion and growth, replacement of old technologies and developing the human resources and institutions required to run the network and services. In 1993, small island developing States invested a total of US$ 909 million on telecommunication development, of which Singapore invested $338 million.

37. During the same year, small island developing States obtained US$ 4,033 million as revenues from telecommunication operations, half of which went to Singapore. This revenue accounted for between 2 and 10 per cent of GDP in small island developing States, which is a significant contribution to their economies. As these networks grew at an average rate of 7 per cent per annum between 1984 and 1994 (cf., Africa, 8.6 per cent; Europe, 4.8 per cent; Asia-

Pacific, 6 per cent), the need for faster growth and the introduction of new technologies and services, as well as the early retirement of old systems, means that small island developing States will need to increase their investment levels by more than 50 per cent during the next decade to pave the way for the information society of the twenty-first century. Table 3 shows investment in telecommunication in small island developing States. During the period 1994-2000, small island developing States are expected to invest a total of US$ 4.5 billion, or US$ 562 million annually. This projection is based on the annual growth rate in main lines and in population over the past eight years. An average cost of US$ 1,500 per main line is used.

38. While small island developing States import most of the telecommunication equipment they use, some do manufacture and export telecommunication equipment, notably Singapore, which exported US$ 3,980 million worth of equipment in 1994.

39. More than 70 per cent of telecommunication investment is internally generated, while multilateral and bilateral assistance makes up the rest. The World Bank provides about 5 per cent of telecommunication investment financing to developing countries. With increasing privatization, the private sector is expected to displace Governments as the main source of financing for telecommunication development. But it will be some time before there is a scramble to finance telecommunication investment in small island developing States and traditional sources should continue unabated. ITU meanwhile has just created its own organization - WorldTel - to finance telecommunication development for the least developed networks, mainly in least developed countries. Some small island developing States may gain access to loans from WorldTel.

40. There is evidence that those countries that have privatized their networks and introduced competition have seen a sharp rise in private sector investment and faster expansion of their networks. Cyprus is a good example among the small island developing States.

C. Introduction of new technologies

General

41. New technologies have come about owing to digital techniques that have facilitated a merger between telecommunications and computing, generating what is popularly known as information technologies. The network to carry the new information services is ISDN, narrow or wide band. The global information infrastructure will essentially be an ISDN with virtually unlimited capacity to carry voice text and video or multimedia services. Some of these new services are briefly described below.

(a) Mobile cellular phones

42. Mobile cellular phones have been introduced in 18 small island developing States, with a total of 320,300 subscribers in 1993: Singapore, having 229,200; Jamaica, 26,100; Cyprus, 22,900; and Mauritius, 5,700, being the other significant users. Digital global systems for mobile communications (GSM)

cellular systems are quickly gaining preponderance well above the earlier analogue types. Other than telephones, cellular radios could provide radio paging and data transmission. The near future has promise for global mobile services via satellite and many small island developing States will spearhead their introduction and proliferation.

(b) Internet

43. This is the fastest growing service today, with Singapore, Cyprus and Jamaica being the principal users in 1994. Figures for 1995 will show a staggering increase in both the number of subscribers and the number of countries plugged in.

(c) Cable television

44. Multi-channel cable TV to the home has been gaining penetration in cities in developed countries in recent years. Aruba is one of the small island developing States in the lead in this area. In Singapore, the fibre-to-the-home project, which will carry cable TV among a host of services, started in 1991 and is scheduled to be completed in 2005. This will give ISDN quality circuits for an unlimited range of services to and from the home. Other small island developing States are meanwhile enjoying direct TV from satellites beamed to their regions. A dish and receiving equipment, and in some cases a decoder, are required to gain access.

(d) Other technologies

45. Other new facilities and services that small island developing States are using or will be applying include packet date switching, intelligent networks, smart services, ISDN, optical fibre cable networks, direct satellite broadcasting, telemedicine, teleshopping, telebanking, tele-education, telecommuning, interactive television and high-definition television, among other things.

D. New policy options and opportunities

General

46. Although the development gap between the haves and the have-nots remains wide, there is evidence that the faster main line growth in developing countries will lead to a substantial bridging of this gap during the next two or three decades. This will make the achievement of the missing link target possible, that is, by the early part of the twenty-first century, nearly all of mankind should be within easy reach of the telephone and services that accompany it. The new developments under way in many countries, and the new spirit of partnership are all reinforcing synergistic factors that will accelerate telecommunication development in developing countries.

47. In the present environment, the principal ingredients contributing to a more rapid telecommunication development are globalization, restructuring and technology.

(a) Globalization

48. Globalization may be defined as the apparent shrinking of our planet Earth through the preponderant universal and readily accessible transport and communications offerings, in particular the telecommunication and information services provided largely by transnational operators and service providers. Globalization gives birth to the idea of a "global village", which conjures up the picture of a vast, worldwide communication network of interconnected satellite, land and undersea cable links, enabling the rapid transfer of voice, data and image traffic. But the "global village" is still very much in the making as the majority of the world's population does not have the resources or the infrastructure to access communication networks. Yet, the technological capability to reach distant places via microwave, cable or satellite is a reality and the expanding web of communications by land, sea and air, spurred by the dramatic growth in international voice, data and image traffic, brings us ever closer to a true village.

(b) Sector restructuring

49. Sector restructuring is changing the nature of the telecommunications industry from a public utility service supplied under a natural monopoly to a multi-service, multi-supplier, multimedia market. The role of Government is shifting from one of direct provision of services to regulation. The character of the public telecommunication operator has changed from being a government department to an independent commercial entity. An increasing number of countries have gone further in liberalizing the equipment supply market, in introducing competition, particularly for mobile, data and value-added services, and in privatizing the public operator. Over the next decade, private ownership may become the norm rather than the exception in telecommunications, and in many countries the public telecommunication operator will be the largest national firm, with a stock market listing. But if the benefits of these changes are to be passed on to the consumer, as well as to the shareholder, the role of the regulator will need to become more important.

50. Over recent years, a new environment of economic reform and structural adjustment has swept through the developing world, which has invariably affected small island developing States. In the telecommunications sector, because of the intrinsic monopolistic tendencies of national public telecommunication operators, reforms restructuring, liberalization and privatization have been more urgent than ever. In most small island developing States, for historical reasons, the telecommunication entities were owned or partly owned by a foreign operator emanating from a former colonial Power, such as Cable and Wireless of the United Kingdom.

51. With sector restructuring and privatization gathering pace, private investment will increase as Governments divest. In this environment it is of paramount importance that Governments establish a strong and efficient regulatory framework, something akin to the Federal Communications Commission of the United States of America, to ensure that the new maze of telecommunication activities is properly regulated. The regulatory entity would have to take the following steps in relating to the private sector:

(a) Promote competition;

(b) Encourage private investment;

(c) Redefine universal service;

(d) Regulate for the benefit of the user;

(e) Favour regulatory convergence;

(f) Require open access;

(g) Accelerate the stands-making process;

(h) Encourage public telecommunications operators to price access not usage;

(i) Liberalize private networks;

(j) Nurture local content developers.

(c) Technological change

52. Technological change has transformed the industry over the past decade and the pace of change shows no evidence of slowing down. Three major developments - digitalization, mobility and bandwidth - mean that the industry in 1995 is virtually unrecognizable from that of 1985. The exchange of information in digital form is breaking down the barriers that have traditionally existed between the telecommunications industry and its close cousins - computing and broadcasting - that together comprise the electronic information industry. The development of mobile communications has opened up a new cycle of investment, market entry and service innovation, which has created a new industry in its own right. The provision of bandwidth based on fibre optic and satellite technology, together with the enormous leap forward in data compression technology, is fundamentally altering the type of service that can be offered and the way in which those services are tariffed.

53. The three factors or ingredients above contribute in a synergistic way to accelerating the pace of telecommunication development. They offer new opportunities and options from which small island developing States and other developing countries will benefit.

III. PROBLEMS OF THE SECTOR

A. The problems

54. In general, the telecommunications sector in the developing countries is encumbered with underinvestment, poor management owing to monopolistic structures and inadequate human resources development, poor maintenance of equipment and networks, low penetration of services, particularly in the rural areas, high tariffs owing to lack of competition and relatively higher unit

costs for provision of services. The current environment is particularly evolutionary and inherently complex, ushering in a new problem of policy choice, for instance, whether to privatize, what technology to adopt, how much to invest. Small island developing States suffer from one or more of these problems.

55. Equipment maintenance problems are often aggravated by poor planning and unorthodox installation practices. Recent hurricanes Luis and Marilyn caused severe damages in Antigua and Barbuda, Dominica and Saint Kitts and Nevis; less seriously affected were Barbados and Saint Thomas (United States Virgin Islands). Local distribution cables hanging awkwardly between poles were easy victims to hostile winds, falling trees and other flying missiles. Normal practice in cities is to have such cables buried in ducts. Any system that helps in early warning against disasters should itself be secured from such disasters.

56. Human resources development is becoming increasingly expensive, owing in part to the rapid change in technology and techniques and the requirement for a higher calibre of trained personnel. Foreign-owned public telecommunications operators have often hidden this problem by employing expatriates, but they must now come to grips with training indigenous personnel.

57. Although globalization has been cited as one of the factors promoting rapid telecommunication development, the paradox is that globalization is a double-edged sword which can become a problem, especially for the weaker, smaller public telecommunication operators, which have not been able to quickly embrace globalization and the information revolution it brings. Instead of consolidating and taking off, the weaker networks may in fact become marginalized.

58. There is also a real risk that the information revolution will exacerbate the gap between the information poor and the information rich. This will have serious implications; in the future, access to information will more directly affect the welfare of individual citizens. It may determine opportunities for work, education or medical treatment. For this reason, public policy makers must continue to insist upon goals of universal access and affordability, wherever possible. In the absence of such a vision, much of the investment needed to create new services is likely to be targeted at wealthy neighbourhoods, at the expense of the urban poor and those in rural areas. Some degree of cross-subsidization may be necessary, from international services to national services, for example, or from mature markets to new services. However, it is important to ensure that cross-subsidies do not interfere with the operation of normal market processes or create havens where competitive market entry is disabled by unfair pricing strategies on the part of incumbent network operators.

B. Activities to address the problems

1. Buenos Aires Action Plan

59. The World Telecommunication Development Conference, held at Buenos Aires in March 1994, promulgated the Buenos Aires Action Plan, with a core of 12 programmes designed to address priority and problematic areas in the development of telecommunications in the developing countries. The programmes are as follows:

1. Policies, strategies and financing;
2. Human resources management and development;
3. Guidelines for the elaboration of a business-oriented development plan;
4. Development of maritime radio-communication services;
5. Computer-aided network planning;
6. Frequency management;
7. Improvement of maintenance;
8. Mobile cellular radio telephone systems;
9. Integrated rural development;
10. Broadcasting infrastructure;
11. Information services;
12. Development of telematics and computer networks.

60. In addition to the 12 core programmes, regular world and regional development conferences (held every four years) will develop global policies and regional strategies, while study groups will study specific questions of concern to the developing countries and make recommendations thereon.

2. SIDSNET

61. The problems of access to telematics facilities for development-oriented activities were treated in the joint ITU/UNESCO study entitled "The right to communicate: At what price?" and subsequently taken into account in both the Buenos Aires Action Plan (programme 12) and the Barbados Plan of Action (SIDSNET).

62. ITU and UNESCO initiated a pilot project on access to telematics facilities in the Caribbean region, which started in 1995 with support from six other international organizations (Commonwealth of Learning (COL), International

Council for Scientific and Technical Information (ICSTI), ITU, Pan American Health Organization (PAHO), United Nations Development Programme (UNDP) and UNESCO). This project is considered as a test bed for the future SIDSNET.

63. The concept of a pilot project to demonstrate cooperative principles for improving this situation was developed during a joint mission and was refined and approved at a regional seminar held at Port-of-Spain on 22 June 1994. The idea of twinning one or more of the countries belonging to the Organization of Eastern Caribbean States (OECS) with a more advanced neighbour such as Barbados was seen as a promising possibility and was followed up through additional contacts with potential co-sponsoring agencies and further study of the needs in Barbados, Saint Lucia and Saint Vincent and the Grenadines by surveys of potential participating institutions.

64. In February 1995, a second mission representing UNESCO and ICSTI was fielded, in collaboration with ITU, to assess recent developments and the commitment of concerned national and regional organizations, and to finalize plans for the pilot project. The mission's findings indicated an increased awareness about telematics, in particular the Internet, as well as a plan in advanced stages by Barbados External Telecommunications (BET) to offer full Internet services. They also confirmed the strong potential interest of all organizations consulted to participate in the implementation of the pilot project.

3. Other activities

65. There are a large number of ongoing projects and activities in various disciplines in small island developing States, including the following:

(a) ITU is cooperating with the Pacific Forum to provide human resources development workshops and seminars for small island developing States in Oceania;

(b) In the Caribbean, current activities include:

(i) ITU is collaborating with the Caribbean News Agency (CANA), UNDP and UNESCO on the establishment of a regional satellite news network;

(ii) Cable and Wireless has inaugurated the Eastern Caribbean Fibre System (ECFS) for 14 countries, while the Western Caribbean Fibre System (WCFS) will be completed by 1996;

(iii) A seminar has been organized by the International Maritime Satellite Organization (INMARSAT) in conjunction with ITU, the Caribbean Telecommunication Union (CTU) and the Caribbean Association of National Telecommunications Organizations (CANTO) on mobile satellite communications. A workshop on telecommunication policy issues was being sponsored by ITU and CTU;

(iv) Under programme 9 of the Buenos Aires Action Plan, ITU is preparing to undertake pilot studies on rural telecommunications in Guyana, Haiti and Suriname;

(v) Disaster communication issues are being handled by ITU in close cooperation with the Caribbean Disaster Emergency Response Agency (CDERA);

(vi) The United Nations Industrial Development Organization (UNIDO) is contributing in various ways to telecommunication improvements in small island developing States, for example, tropicalization of equipment, establishment of maintenance centres, remote sensing and geographic information systems, fishermen's safety at sea and Internet connectivity.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

66. From the analysis above, the following conclusions can be made:

(a) Telecommunication is essential for the socio-economic development of any country. It directly contributes to a country's GDP, is a lifeline to other service industries and is of crucial value added to the non-service industries;

(b) Small island developing States as a group have reasonably well-developed networks, with network penetrations much ahead of the average for developing countries. Yet there remains plenty of room for further growth and improvement in most small island developing States. Even for the advanced networks in the United States Virgin Islands, Singapore and Malta no saturation of traditional and new services is on the horizon;

(c) Overwhelming global trends, namely, globalization, liberalization and revolutionary technological advances, are together enhancing telecommunication development. Small island developing States must take advantage of this scenario, while ensuring that they create an adequate regulatory entity to assure harmonious growth of an increasingly complex and rapidly changing industry;

(d) While small island developing States need to cooperate with one another, they must also maintain and strengthen their communications and business links on a regional and subregional basis with their bigger neighbours on the continental shelf, as well as with development partners abroad;

(e) Most small island developing States are located in the tropical zone, which is exposed to hazardous climatic conditions. Small island developing States, therefore, need to develop special networks for disaster communications for the purposes of early warning, public education and disaster mitigation. Studies also need to be undertaken in pursuance of Agenda 21 ideals to harness the immense power of information technologies for environmental protection.

B. Recommendations

1. To small island developing States

67. Small island developing States should consider closer cooperation among themselves to pool their resources and strengthen their bargaining positions. This is difficult because of the wide geographical spread of these States. However, within certain regions such as the Pacific and the Caribbean, there are sufficient small island developing States and other developing countries to act together in areas such as joint training and pooled equipment purchases. They should also take advantage of existing cooperative regional and international telecommunication activities, as well as new projects and institutions such as WorldTel.

68. Governments of small island developing States should give high priority to rural telecommunications in order to bring about easier access to telecommunication services by rural populations. Governments need to define clear universal service objectives and specify how, within the prevailing conditions, they can be achieved. Policy makers may consider asserting pre-conditions for the franchising or privatization of lucrative services, such as mobile communications or international services, for example by stating obligations to develop rural telecommunications in the licence conditions of new operators.

69. Small island developing States should increase their investment in telecommunications development in order to increase the penetration of basic telecommunications in the country as a step towards achieving universal availability of those services and to facilitate the introduction of new services for the information society of the twenty-first century.

70. Small island developing States should endeavour to develop special networks on a cooperative subregional basis for (a) disaster communications; (b) environmental protection; and (c) other telematic services on Internet for specific concerns of small island developing States in tourism, agriculture and other activities that are crucial for their sustainable development.

71. Where public or private telecommunications monopolies still exist, it is strongly recommended that steps be taken to create a competitive environment through restructuring and liberalization of service provision and market access.

2. To development partners of small island developing States

72. Development partners should assist small island developing States in identifying the best ways and means of securing financial assistance from different sources. This could be done through organizing investment seminars for small island developing States to help raise funds for telecommunication investment. There needs to be mutual understanding of the requirements and obligations of each party (country, development partners, private sector). This will help small island developing States to adopt a long-term strategy to make their telecommunication sectors self-sufficient.

73. Multilateral donor agencies, such as the World Bank and the regional development banks, should focus a higher proportion of their overall lending on small island developing States and should be more systematic by funding a series of projects over a number of years to remedy the present uneven pattern of investment. The development banks should work together to develop a common set of criteria to be used when evaluating potential projects.

Notes

1/ The International Telecommunication Union is the United Nations specialized agency responsible for the regulation, standardization and development of telecommunications worldwide. Created on 17 May 1865, it is the oldest organization in the United Nations family.